

Application No. 09/847,605
Response dated March 15, 2005
Reply to Office Action of February 15, 2005
Attorney Docket No. DP-302846

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claim 1 (Currently Amended). An etched interconnect for fuel cell elements comprising solid oxide electrolyte, an anode, and a cathode, wherein said interconnect comprises:

a single conductive base sheet having first and second faces on opposite sides of said base sheet;

anode gas flow passages disposed on said first face of said base sheet said anode gas flow passages being configured with a first unique anode gas flow passage geometry comprising a depth and pattern selected to effect optimal fuel gas flow across the interconnect;

cathode gas flow passages disposed on said second face of said base sheet said cathode gas flow passages being configured with a second unique cathode gas flow passage geometry that is different from the anode gas flow passage geometry, the cathode gas flow passage geometry comprising a depth and pattern selected to effect optimal oxidant gas flow across the interconnect.

wherein said anode gas flow passages and said cathode gas flow passages each have a unique geometry of varying cross-section and width across the interconnect sufficient to effect local variations in flow direction, velocity, and turbulence.

Claim 2 (Original). The interconnect of claim 1, wherein said anode gas flow passage geometry comprises a large quantity of small diameter, closely spaced contact points.

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Claim 3 (Original). The interconnect of claim 2, wherein said contact points are present on said anode face at a density of about 10 to about 25 contact points per square centimeter.

Claim 4 (Original). The interconnect of claim 2, wherein said contact points are generally round and have a diameter of about 0.5 to about 1 millimeter.

Claim 5 (Previously Presented). The interconnect of claim 1, wherein said cathode gas flow passages comprise deep flow passages to promote oxidant mixing and a large surface area for optimum heat transfer to the cathode gas flow.

Claim 6 (Original). The interconnect of claim 5, wherein said cathode gas flow passages have a depth of about 1.0 mm.

Claim 7 (Previously Presented). The interconnect of claim 5, wherein said second face of said base sheet has a projected area and said cathode gas flow passages have a surface area of about 2 to about 4 times the projected area of said second face of said base sheet.

Claim 8 (Original). The interconnect of claim 1, further comprising:
a conductive coating disposed on one or more faces of said conductive base sheet, said conductive coating selected to enhance electrical conductivity between said interconnect and mating fuel cell surfaces.

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Claim 9 (Original). The interconnect of claim 1, further comprising:
a yielding layer disposed on one or more faces of said conductive base sheet, said yielding layer selected to enhance conformity of said interconnect to mating fuel cell surfaces.

Claim 10 (Original). The interconnect of claim 1, further comprising:
through passages arranged along outer perimeters of said interconnects to form integral inlet and outlet manifolds when stacked.

Claims 11-22 (Cancelled).

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Claim 23 (Currently Amended). A fuel cell stack assembly comprising a plurality of fuel cell elements comprising solid oxide electrolyte, an anode, and a cathode, stacked anode to cathode and interleaved with etched interconnects, said interconnects comprising:

a single conductive base sheet having opposing first and second faces; said first face having anode gas flow passages disposed thereon, said anode gas flow passages being configured with a first unique anode gas flow passage geometry comprising a depth and pattern selected to effect optimal fuel gas flow across the interconnect; and

said second face having cathode gas flow passages disposed thereon, said cathode gas flow passages being configured with a second unique cathode gas flow passage geometry that is different from the anode gas flow passage geometry, the cathode gas flow passage geometry comprising a depth and pattern selected to effect optimal oxidant gas flow across the interconnect.

wherein said anode gas flow passages and said cathode gas flow passages each have a unique geometry of varying cross-section and width across the interconnect sufficient to effect local variations in flow direction, velocity, and turbulence.

Claim 24 (Original). The fuel cell assembly of claim 23, wherein said anode gas flow passages comprise a large quantity of small diameter, closely spaced contact points; and said cathode gas flow passages comprise deep flow passages to promote oxidant mixing and a large surface area for optimum heat transfer to the cathode gas stream.

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Claim 25 (Original). The fuel cell assembly of claim 23, further comprising:
gas supply manifolds comprising external stamped sheet metal manifolds
secured to outer surfaces of said fuel cell stack assembly.

Claim 26 (Original). The fuel cell assembly of claim 23, further comprising:
integral gas supply manifolds comprising through passages arranged along
outer perimeter portions of said interconnects so that said interconnect gas supply
through passages align with matching through holes in said fuel cells.

Claim 27 (Original). The fuel cell assembly of claim 23, wherein said interconnects are
fused to said fuel cells.

Claim 28 (Original). The fuel cell assembly of claim 23, further comprising:
a conductive coating disposed on one or more faces of said
conductive base sheet, said conductive coating selected to enhance electrical conductivity
between said interconnect and mating fuel cell surfaces.

Claim 29 (Original). The fuel cell assembly of claim 23, further comprising:
a yielding layer disposed on one or more faces of said conductive base
sheet, said yielding layer selected to enhance conformity of said interconnect to surface
irregularities in mating fuel cell surfaces.

Claim 30 (New). The interconnect of claim 1, wherein said anode gas flow passage
geometry comprises a depth and pattern that varies across the interconnect.

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Claim 31 (New). The interconnect of claim 1, wherein said cathode gas flow passage geometry comprises a depth and pattern that varies across the interconnect.

Claim 32 (New). The fuel cell assembly of claim 23, wherein said anode gas flow passage geometry comprises a depth and pattern that varies across the interconnect.

Claim 33 (New). The fuel cell assembly of claim 23, wherein said cathode gas flow passage geometry comprises a depth and pattern that varies across the interconnect.